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Stuttering

Hope Through Research

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HE 20.3502:

Stuttering—
Hope Through Research

"What dressing will you have on your salad?" the waiter said.

"R-r-r-r-r-r-ro-ro-roque-roque-I'll have the roque—I think I'd like to try the ro-ro-ro----Thousand Island."

Stutterers laugh at that joke, too. For them, however, stuttering has far more serious consequences than not getting their favorite salad dressing. The frustration and struggle to get the words out can embarrass and exhaust both speaker and listener. Some stutterers avoid the struggle by dodging situations where they have to speak. Children may say "Don't know," to the teacher —even when they do know—rather than face laughter and teasing from their classmates. Other stutterers keep their minds a phrase or two ahead of their mouths. That way they can pick out problem words and find substitutes. In either case the stutterer suffers the loss of smooth and easy speech, the spontaneous exchange of feelings and ideas so important at school or work, among family and friends.

"It is like a sharp mmmmmomentary twist of pain that I eexxsss---perience again and again throughout eeeeevery ddddday ah ah of my life. I ss-sssssometimes sssssssssee it as a as a nnnnnnnnnail in my shoe that iiiiis thththere and p-p-pro-bab-bly always wwww-ww-wi-ll be there..." says a 36-year-old woman.

Yet there is reason to hope that that woman, and others, particularly younger stutterers, will be able to escape the twist of pain. With therapy—and sometimes without it—many stutterers achieve more normal speech. Studies describing the differences in the way normal and stuttered speech is produced are pointing to new directions in therapy. Spearheading this research is the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS), the leading Federal agency supporting research on speech disorders. The Institute currently supports investigators who are developing new techniques for the study of normal as well as abnormal speech.

Cover:
Getting to know each other is very important in speech therapy. Here the therapist helps a youngster learn the letter "s."

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S/N 017-049-00120-4

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Early warning signs

Stuttering is a disorder in which the rhythmic flow, or fluency, of speech is disrupted by rapid-fire repetitions of sounds, prolonged vowels, and complete stops —verbal blocks. A stutterer's speech is often uncontrollable—sometimes faster, but usually slower than the average speaking rate. Sometimes, too, the voice changes in pitch, loudness, and inflection.

Observations of young children during the early stages of stuttering have led to a list of warning signs that can help identify a child who is developing a speech problem. Most children use "um's" and "ah's," and will repeat words or syllables as they learn to speak. It is not a serious concern if a child says, "I like to go and and and and play games," unless such repetitions occur often, more than once every 20 words or so.

Repeating whole words is not necessarily a sign of stuttering; however, repeating speech sounds or syllables such as in the song "K-K-K-Katy" is.

Sometimes a stutterer will exhibit tension while prolonging a sound. For example, the 8-year-old who says, "Annnnnnnd---and---thththen I I drank it" with lips trembling at the same time. Children who experience such a stuttering tremor usually become frightened, angry, and frustrated at their inability to speak. A further danger sign is a rise in pitch as the child draws out the syllable.

The appearance of a child or adult experiencing the most severe signs of stuttering is dramatic: As they struggle to get a word out, their whole face may contort, the jaw may jerk, the mouth open, tongue protrude, and eyes roll. Tension can spread through the whole body. A moment of overwhelming struggle occurs during the speech block. The feeling of panic and loss of control is so overwhelming that the stutterer will try to avoid any repetition of the experience in the future. Children may begin to substitute simple words for more troublesome ones; they may giggle before speaking to help get them started, or they may adopt a drawl

The cause of stuttering remains a mystery.

or other speech mannerism that temporarily displaces the stuttering.

NINCDS is sponsoring a study to analyze the speaking characteristics of young children between 4 and 6 years of age—the time that stuttering most commonly develops. By determining which aspects of speech distinguish those who develop a stuttering problem from those who do not, methods of early detection and improved treatment can be developed.

While the symptoms of stuttering are easy to recognize, the underlying cause remains a mystery. Hippocrates thought that stuttering was due to dryness of the tongue, and he prescribed blistering substances to drain away the black bile responsible. A Roman physician recommended gargling and massages to strengthen a weak tongue. Seventeenth century scientist Francis Bacon suggested hot wine to thaw a "refrigerated" tongue. Too large a tongue was the fault, according to a 19th century Prussian physician, so he snipped pieces off stutterers' tongues. Alexander Melville Bell, father of the telephone inventor, insisted stuttering was simply a bad habit that could be overcome by reeducation.

Some theories today attribute stuttering to problems in the control of the muscles of speech. As recently as the fifties and sixties, however, stuttering was thought to arise from deep-rooted personality problems, and psychotherapy was recommended.

Who stutters?

Stutterers represent the whole range of personality types, levels of emotional adjustment, and intelligence. Winston Churchill was a stutterer (or stammerer, as the English prefer to say). So were Sir Isaac Newton, King George VI of England, and writer Somerset Maugham.

There are more than 15 million stutterers in the world today and approximately 1 million in the United States alone.

Most stuttering begins after a child has mastered the basics of speech and is starting to talk automatically. One out of 30 children will then undergo a brief period

The "Clan of the Tangled Tongue" includes Sir Isaac Newton, Sir Winston Churchill, and King George VI of England.

of stuttering, lasting 6 months or so. Boys are four times as likely as girls to be stutterers.

Occasionally stuttering arises in an older child or even in an adult. It may follow an illness or an emotionally shattering event, such as a death in the family. Stuttering may also occur following brain injury, either due to head injury or after a stroke. No matter how the problem begins, stutterers generally experience their worst moments under conditions of stress or emotional tension: ordering in a crowded restaurant, talking over the telephone, speaking in public, asking the boss for a raise.

Stuttering does not develop in a predictable pattern. In children, speech difficulties can disappear for weeks or months only to return in full force. About 80 percent of children with a stuttering problem are able to speak normally by the time they are adults—whether they've had therapy or not. Adult stutterers have also been known to stop stuttering for no apparent reason.

Indeed, all stutterers can speak fluently some of the time. Most can also whisper smoothly, speak in unison,

No barrier to a singing career: Country and western singer Mel Tillis stutters in everyday speech; has no problem when he sings.

and sing with no hesitations. Country and western singer Mel Tillis is an example of a stutterer with a successful singing career.

Most stutterers also speak easily when they are prevented from hearing their own voices, when talking to pets and small children, or when addressing themselves in the mirror. All these instances of fluency demonstrate that nothing is basically wrong with the stutterer's speech machinery.

If the problem is not in the mouth or the throat, is it in the brain? Stuttering can arise from specific brain damage, but only rarely. In general, stuttering is not associated with any measurable brain abnormality and is not related to intelligence.

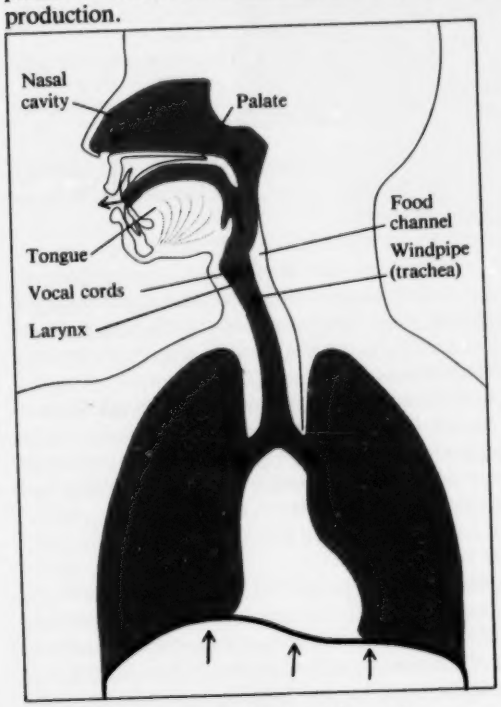
The new research

To find out what is associated with stuttering, investigators are analyzing how speech sounds are normally produced and what goes wrong when a person stutters.

To produce speech, you must shape the sound that is produced as air moves up from the lungs through the throat and into the mouth. Breathing muscles in the chest provide the pressure that drives air up the windpipe across the voice box, or larynx. At the larynx, the air passes between two folds of tissue known as the

vocal cords, and sets them vibrating. Like the reeds of oboes, the vibrating cords convert air flow into audible sound.

The shape and amount of tension of the cords determine the pitch of the voice—how high or low it sounds. The further refining of voice into speech sounds depends on the relative shape and position of other parts of the vocal tract: the lips, tongue, jaws, cheeks, and palate. All told, over 100 muscles are involved in speech production.



Upward movement of the diaphragm forces air up through the windpipe, setting the vocal cords vibrating. Sounds are shaped into words by movement of other parts of the vocal tract: tongue, lips, teeth, palate.

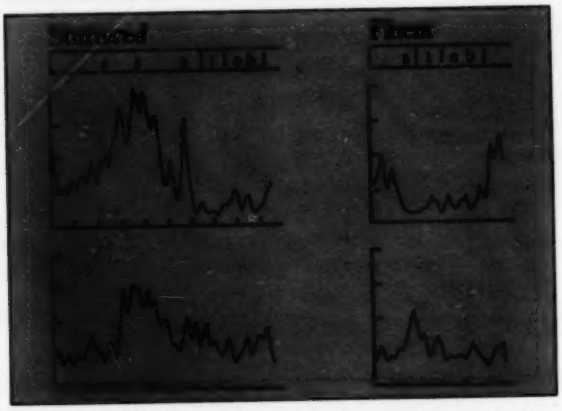
Closeup of the vocal cords shows them in the open position (left), when you breathe but don't speak, and closed (right) when generating sound.

Because the larynx is the source of sound, scientists are studying it closely, paying particular attention to the muscles that control the vocal cords. One set of muscles pulls the vocal cords apart, opening the airway. Opening allows you to take a deep breath, for example. An opposing set of muscles closes the vocal cords, allowing you to produce voice. The vocal cords are also in a fully closed position when you swallow. That helps prevent food from getting into the airway and causing choking.

Normally the laryngeal muscles work in a coordinated and reciprocal manner: One set of muscles relaxes while an opposing set of muscles contracts. When NINCDS-supported investigators at Haskins Laboratories, New Haven, Conn. studied the behavior of the laryngeal muscles during stuttered speech however, they were astonished to find that both sets of muscles contracted—setting up a virtual tug of war for control of the cords. This striking difference between normal and abnormal muscle behavior can be observed in the same speaker when speaking fluently and when stuttering.

Scientists have also noted excessive muscle activity during stuttering. Not only do both sets of opposing muscles contract during stuttering, but they also contract as hard as they can.

Ingenious techniques have enabled scientists to record the abnormal muscle movements. Investigators can hook wires directly into throat and neck muscles, for example, and pick up the electrical activity associated with muscle movement. They can also observe the



Similar-shaped graphs on left indicate that opposing vocal cord muscles both contract when a person stutters on the word "syllable." Under fluent conditions (right) the graphs are mirror images: when one muscle relaxes, the other contracts.

movements of the vocal cords directly by using special fiberoptic equipment transmitting light through a flexible narrow tube which is inserted into the subject's nose.

In some cases the inappropriate muscle activity prevents the vocal cords from coming together long enough to make a normal sound. In other cases the vocal cords are so tightly locked no sound at all can emerge: The speaker is totally blocked. Unusually high levels of muscle activity have also been discovered in stutterers' tongue muscles. Whether the extreme muscle contractions cause the failure of coordination of the muscles of speech, or are a reaction to the failure, is not known. Conditions that reduce muscle activity, however, appear to ease stuttering.

The muscle activity associated with partial or complete verbal blocks is not the only aspect of stutterers' speech scientists have analyzed. Both trained and untrained listeners can distinguish the voices of stutterers when speaking fluently from normal speakers. A slower rate of speech and an abnormal rhythm were the cues

that identified the stutterers. Such differences may result from the stutterer's habit of planning words ahead to avoid a block and consciously trying to control the speech muscles.

Experiments in several laboratories have shown that stutterers are slower than normal speakers to begin vocalizations (for instance, when they are told to make a sound as soon as a signal goes on). Stutterers are also slower to make transitions from voiced sounds (when the vocal cords vibrate) to unvoiced sounds (when the vocal cords do not vibrate). When a stutterer switches from ordinary speech to some nonstuttering mode, such as choral speaking, the rate of speech also tends to decrease. So some scientists speculate that stutterers have a lower than normal maximum speaking rate. Their everyday speech frequently exceeds that limit, however, and trips them up.

Improved techniques have led to a more detailed description of stuttering and the conclusion by some scientists that what we call stuttering may be more than one condition. Each condition, in turn, may have a different cause. Another conjecture is that stuttering results

NINCDS scientists see and tape the vocal cords in action using new fiberoptic equipment. Speech scientists have been able to observe abnormal contractions in the vocal cords of stutterers.

Stuttering seems to run in families.

from the interaction of several factors. For example, a child may inherit a tendency to stutter, but certain environmental conditions may have to be present for stuttering to develop.

Stuttering does seem to run in families, and it affects boys more than girls. NINCDS-supported scientists at Yale University have studied 555 stutterers and more than 2,000 of their close relatives. The results support the idea that a susceptibility to stuttering is inherited, but just how is not clear. Certainly the inheritance pattern does not follow the simple rules that explain how eye color, hair color, or colorblindness is inherited.

To search for a clue to a cause of stuttering—genetic or otherwise—investigators are adopting newly available techniques to investigate brain activity in stutterers. Since the brain is the master regulator and coordinator of all body activity, it is possible that some slight brain dysfunction might disturb the clockwork coordination of the organs of speech. On those occasions when stutterers do speak fluently, the coordination task is usually simplified. Whispering, for example, does not involve vibration of the vocal cords at all.

A subtle brain dysfunction might also affect our ability to hear what we're saying as we say it. Alterations in that hearing "feedback" system or in similar systems monitoring other parts of the speech production machinery, may also be involved in stuttering. Scientists are also just beginning to examine the brain areas that are active during normal and stuttered speech. Important, too, are studies of how the two halves of the brain, the cerebral hemispheres, interact in speech activities.

New treatments and old schools

While research has yet to explain why stuttering occurs, some of the new findings have been applied to therapy:

• *Biofeedback.* One recent approach uses biofeedback techniques to help stutterers relax their throat muscles. The stutterer hears a tone that becomes louder with increased muscle tension, and he or she is instructed to quiet the tone. Usually when the person succeeds in reducing the tension of the throat muscles, he or she is able to speak without stuttering.

• *Larynx control.* Some treatment programs emphasize modifying sound production at the larynx itself. Stutterers are taught to speak with lower levels of laryngeal activity, slower rates of vocal cord opening and closing, and loose rather than tight vocal cord closure. The resultant voice is somewhat lower, softer, smoother, and slower than average speech. To evaluate this technique, as well as other approaches to stuttering therapy, long-term studies will be necessary.

• *Regulating speech rate.* Some patients are taught to slow their overall speech rate. Devices used in such training include ear receivers that play back the speaker's words with a few seconds' delay (delayed auditory feedback). Sometimes a slow "pacing" tone is presented to one ear to provide a rhythm for the stutterer to follow in pronouncing syllables. Although both devices reduce stuttering, they often result in monotonous

Never too late: Annie Glenn, wife of astronaut (now Senator) John Glenn, was helped by therapy she began at age 53. Refresher courses in breath control and speaking rate help maintain fluency.

"Stuttering is not the worst curse, it's the way you respond."

speech. However, for some patients monotonous but fluent speech may be better than severe stuttering.

In general, therapists employing the new techniques in treating stuttering belong to one of two traditional schools: One school believes that stutterers and non-stutterers fall into two distinct groups and that no adult stutterer can be completely cured. Therapists of that conviction teach their clients to stutter easily. Stutterers learn to reduce the tension and struggle so that they do not become completely blocked in speech. Once a person gains confidence in the skill to stutter easily, the frequency of stuttering often drops dramatically. Because normal speakers do stutter occasionally, recipients of the "stutter easy" therapy can learn to speak without noticeable hesitations.

Charles Van Riper, the leading proponent of that approach and a stutterer himself, says, "Stuttering is not the world's worst of all curses...about 99.9 percent of the problem is in the way you respond to the thing!"

The other major school of therapy believes that any stutterer can be taught to be completely fluent. Therapists use methods such as breath control and soft, gentle attacks on words to create fluent speech with no stuttering. Preventing relapses of stuttering once fluency is reached is the most difficult problem with this approach.

A variety of training devices are used by both groups to allow a stutterer to experience fluent speech. A metronome can repress stuttering by setting a slower than normal rate for speech. A relatively new instrument called a masker prevents the stutterer from hearing his or her own voice during a conversation. The portable model consists of earphones and a microphone that rests on the throat near the larynx. Whenever the wearer speaks, the device makes a humming noise in the earphones so the wearer cannot hear his or her words. The device is successful in preventing stuttering even in difficult situations, and some stutterers have found that by using it they eventually learn to speak more fluently unassisted.

The hope for children

Therapists from both schools agree that the development of stuttering in young children is reversible. Treatment often includes the parents as well as the child. Parents are cautioned to listen to the content of the child's speech rather than to how he or she speaks. They are encouraged to be patient, and make speech enjoyable by playing word games and by reading or telling stories. The parents themselves are taught to speak slowly, quietly, and calmly, attacking their words gently. Overall, parents are advised to create pleasant and rewarding situations in which the child can communicate, and to reduce stress in the child's life that can disrupt fluency.

Speech pathologists use everyday objects and toys in play therapy when working with children who have speech problems.

Therapists from both schools also agree that motivation is a key to success. The stutterer who feels frustrated and deprived of normal participation in speech is ripe for therapy. Usually it is best for the stutterer to specify exactly what he or she wants to change rather than just express a vague desire to stop stuttering. Results are more likely to be satisfactory if individuals decide that they most want to reduce their physiological struggle, for example, or change their speaking pattern, or lower anxiety.

Stutterers should seek licensed speech therapists.

Where to go for treatment

In some places in the world anyone can hang out a shingle as a speech therapist. But in the United States, more than 20 states have laws governing the credentials of speech therapists, who also are called speech-language pathologists. The American Speech-Language-Hearing Association, through its standards board, certifies or accredits individual practitioners, educational programs and service agencies. Approximately 24,000 speech pathologists work in U.S. schools, hospitals, clinics, private practices and health departments. Selection of a licensed or certified speech therapist does not guarantee an expert on stuttering therapy, but the therapist should be able to refer the stutterer to an appropriate practitioner.

Evaluating the treatments available for stuttering is a particularly frustrating problem. For one thing, a fraction of stutterers improve with little or no treatment. For another, investigators must follow their subjects for years to see whether any improvement is long lasting. Over a period of 5 to 10 years, therapy techniques continue to evolve. So by the time the results of therapy are evaluated, newer methods may have supplanted those being evaluated.

From another standpoint, the very fact that new techniques are developing and older ones are undergoing revision or refinement is encouraging. Stutterers who quit trying to improve their speech years ago should be advised to try again.

To make a decision about treatment or to exchange ideas and opinions, it may be helpful to join one of the self-help groups for persons who stutter. These groups discuss the problems stutterers face in their daily lives, as well as developments in stuttering research and therapy. They also help stutterers to understand how other people react to them. The National Council of Adult Stutterers and the National Stuttering Project may be able to refer a stutterer to a nearby group.

If you have a friend who stutters or if you come into contact with stutterers, there are ways to ease the embarrassment and frustration. First, try to be patient, though you have other demands on your time. Second, try to maintain eye contact, even when the stutterer looks away during a stuttering block. Finally, never fill in words for the person who stutters. That reinforces a feeling of time pressure and takes away the triumph of finally saying the difficult word.

One scientist who works on stuttering calls it the most fascinating and most frustrating communicative disorder. After years of research the feeling persists that the missing pieces of the stuttering puzzle are close at hand. Rather than having a simple cause—thick tongue or black bile or weak breath control—stuttering may be so complex that scientists will unravel the wonders of normal speech as they search for effective treatment.

For additional information:

American Speech-Language-Hearing Association
10801 Rockville Pike
Rockville, Md. 20852
(301) 897-5700

National Council of Adult Stutterers
c/o Speech and Hearing Clinic
Catholic University of America
Washington, D.C. 20064
(202) 635-5556

National Stuttering Project
4438 Park Boulevard
Oakland, Calif. 94602
(415) 530-1678

National Easter Seal Society, Inc.
2023 W. Ogden Avenue
Chicago, Ill. 60612
(312) 243-8400

Division for Children with Communication Disorders
The Council for Exceptional Children
1920 Association Drive
Reston, Va. 22091
(703) 620-3660

Be patient, maintain eye contact, don't fill in words.

National Association for Hearing and Speech Action
Suite 1000
6110 Executive Boulevard
Rockville, Md. 20852
(301) 897-8682

Speech Foundation of America
152 Lombardy Road
Memphis, Tenn. 38111
(901) 452-0995

Three good films on the prevention of stuttering were underwritten by the Speech Foundation of America: Part 1—*Identifying the Danger Signs,* Part II—*Parent Counseling and the Elimination of the Problem,* and Part III—*Ssstuttering and Your Child. Is it you? Is it me?* The films are available for purchase or rent to self-help groups, schools, and other organizations interested in speech disorders. Write to:

Seven Oaks Productions
9145 Sligo Creek Parkway
Silver Spring, Md. 20901

Specific inquiries concerning programs on stuttering may be directed to:

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